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Original article

Participation of private general practitioners in disease management of malaria in Myanmar

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Abstract

Objective: Myanmar has been trying to improve the disease management of malaria through public health services. The involvement of private general practitioners (GPs) is recognized as one of the key contributory issues in malaria control, but no one has yet made an attempt to study the efficiency of their role. This study aimed to assess the participation of GPs in improvement of disease management. **Methods**: The study was conducted with all 32 GPs practicing at three randomly selected townships with high malaria load situated in Upper Myanmar from June 2006 to March 2007 using a pretest-posttest design to assess their knowledge of the disease management prior to and after intervention. The intervention package consisted of a one-day workshop on diagnosis and treatment of malaria and the supply of facilities for microscopy. Questionnaires filled in before and after tests were compared to assess the change of knowledge after the intervention. Diagnosis and treatment practice during the study period was analysed by review of registers kept by GPs, together with a follow-up survey of their patients for the reliability of data. **Results**: An overall improvement of knowledge was observed and significant changes were apparent for three variables: the criteria for referral of severe malaria, the effect of incomplete treatment and recommended treatment of *Plasmodium vivax*. Pre-test results showed that only 65.6 % of GPs perceived microscopy or Rapid Diagnostic Test kits (RDTs) for confirmation of malaria necessary, while only 15.6 % and 40.6 % of the GPs knew the recommended treatments of falciparum and vivax malaria, respectively. However, after intervention 92 % of the patients were diagnosed as malaria by RDTs and 3 % by microscopy throughout the study. The GPs prescribed artemisinin-based combination therapy (ACTs) to 95 % of confirmed falciparum cases and treated 82.4 % of RDT confirmed falciparum negatives with chloroquine and primaquine. Concurrent with our study, an international NGO, Population Service International, supplied GPs with RDTs and ACTs at subsidized rate which was helpful. **Conclusion**: The study suggests that participation of GPs may help improve the disease management of malaria and thus assist in the country's effort to control malaria.

Keywords: Malaria; Myanmar; Private health services; Disease management; Private general practitioners

INTRODUCTION

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Myanmar reported 475 297 malaria cases and 1 647 deaths in 2006, accounting for about 11 % of all reported cases and 40 % of all reported deaths in the Southeast Asia Region. *Plasmodium falciparum*, the dominant species of malaria parasite in Myanmar, was responsible for 72 % of reported laboratory con-

firmed cases in 2006 and the remaining cases were mostly attributed to *P. vivax* [1].

Malaria control has been implemented through the basic health staffs (BHS) at the community level. The control programme has been trying for malaria patients to have improved access to quality diagnosis and effective treatment according to the National Treatment Guidelines. Microscopes and rapid diagnostic test (RDT) are distributed down to rural health center (RHC) and sub-center (SC) level[2]. Artemisinin-based combination therapy (ACT) was first introduced in 2002 for treatment of confirmed uncomplicated falciparum malaria while treatment for vivax malaria remained the same since the beginning of malaria control programme in 1953 with chloroquine and primaquine (15 mg daily for 14 days in adults)[3].

The Ministry of Health recognizes the role of private sector's involvement as one of the key issues for successful implementation of malaria treatment policy [4]. Of the total 21 725 doctors serving in Myanmar, 13 692 (63 %) are in private sectors [2]. Improvement of disease management has been established at the community level in the public sector through periodic trainings and distribution of diagnostic facilities and appropriate antimalarial drugs while much is not known about the diagnosis and treatment pattern/practice in the private sector. There has been no study of private general practitioners' participation in improvement of malaria management, in Myanmar.

The study aimed to assess the participation of GPs in improvement of disease management for malaria.

MATERIALS AND METHODS

Participants and sample size

The study was conducted from June 2006 to March 2007. All the GPs (32 doctors) practicing in three randomly selected townships out of six townships with high malaria morbidity and mortality in Mandalay Division, were included in the study. Data were collected on monthly visits from malaria treatment registers kept by all GPs throughout the study period. However only 18 doctors kept registers and 4 276 patients in their registers were analysed for the disease management of malaria. During the monthly supervisory visits, five to seven percent of their patients were on purpose selected for interviews, to check for consistency between doctor's registers and patients' response on the diagnosis and treatment. Two hundred and eighty seven patients being diagnosed and treated by participating doctors for malaria within one week prior to the supervisory visit were selected for interviews.

Ethical approval

Verbally informed consents were taken from the GPs to participate in the study. The GPs were informed that some of their patients would be interviewed for their diagnosis and treatment. The study was approved by the Institutional Ethical Committee of the Department of Medical Research (Upper Myanmar).

Study design

Pretest-posttest design was applied in this study. Open-ended, self-administered questionnaires for quantitative approach were used for pre-test and post-test assessments of the GPs' knowledge on the diagnosis and treatment of malaria. Register review was undertaken to assess the activities and quality of GPs' management. Structured questionnaires were used to interview the patients.

Intervention

The intervention package consisted of a one-day workshop on the diagnosis and treatment of malaria and logistic supplies. The first part of the workshop consisted of a short introduction on epidemiology of malaria, covering incubation period, relapse, recrudescence of different species of malaria parasites, malaria endemicity, the main vectors responsible for transmission of malaria and their habitats. The second part was the discussion section on information needed for diagnosis of malaria, complications and criteria for referral of severe and complicated malaria and detailed information on antimalarial treatment guidelines and the National Drug Policy. Private laboratory technicians were trained for malaria microscopy for 3 days. They were also supplied with glass slides, lancets, stain, sprit and cotton. Their coordination with GPs was arranged by the research team for timely examination and return of results.

Pre- and post intervention assessments

Knowledge of general practitioners on malaria before and after the study period was assessed by questionnaires, and changes were analysed. Questions to determine knowledge of the disease were on causal organism (four human malaria parasites), common malaria vectors in Myanmar (*Anopheles minimus*, *A-*

nopheles dirus and *Anopheles annularis*), salient information for diagnosis (history of travel to transmission area, fever and presence of anaemia), malaria endemic areas (areas where transmission exists), species specific incubation period for *P. falciparum* and *P. vivax*, recrudescence and relapse in *P. falciparum* and *P. vivax*, criteria for referral of severe and complicated malaria, cerebral malaria, effect of incomplete treatment (emergence of drug resistance and complications), getting final diagnosis (microscopy and RDT), recommended treatment for *P. falciparum* (ACT) and *P. vivax* (chloroquine and primaquine). A valid response to each question determines a proper knowledge. In case of 'complications and criteria for referral of severe and complicated malaria', which has many criteria. It is assumed as valid response if a doctor responds with the following four common criteria: cerebral malaria, generalized convulsions, severe anaemia and hypoglycaemia. The practice of GPs on malaria diagnosis and treatment during study period was assessed by register review. Validity as determined by any discrepancy between the doctors' registers and the patients' response in diagnosis and treatment was evaluated by the follow-up interviews of their patients.

Statistical analysis

Statistical analysis was done by using R software[5]. Student *t*-test and Fisher's exact tests were performed to find out the significance between variables. Cohen's kappa analyses were done to measure the agreement between statement in registers of doctors and responses of patients.

RESULTS

From the total population of 606 474 living in the three study townships, 239 735 (39.5 %) were residing in malaria transmission areas. The public sectors and private clinics provided the community health care for those areas. Generally, all RHCs and SCs in public sectors and all the GPs managed uncomplicated malaria cases. Severe and complicated malaria cases were referred to the township hospitals.

Characteristics of GP doctors

Out of 32 GPs in the study, 22 (69 %) were full time practitioners while 10 (31 %) were government employees practicing part-time in private clinics. Their mean age was 42 ± 9 years with 23 (72 %) males and nine (28 %) females. Twenty five clinics (78 %) were located in the urban areas and the remaining seven (22 %) in rural areas (villages).

Knowledge changes between pre- and post-test

Knowledge of general practitioners on 'salient information to get diagnosis' and 'malaria endemic areas in the townships' was excellent. It was satisfactory on 'causal organisms of malaria in Myanmar' and 'what is cerebral malaria' even before intervention. Their overall knowledge was improved after the intervention while a significant change was apparent on three variables: criteria for referral of severe and complicated malaria, effect of incomplete treatment and recommended treatment of *P. vivax* (Table 1).

Table 1 Knowledge changes of general practitioners on malaria between pre- and post-test (Total number of GPs = 32).

Facts for knowledge	Distribution of GPs giving valid responses		
	Pre-test *N*(%)	Pre-test *N*(%)	Fisher's exact *P*-value
Causal organism	25 (78.1)	28 (87.5)	0.201
Common malaria vectors	3 (9.4)	13 (40.6)	0.058
Salient information for diagnosis	32 (100.0)	32 (100.0)	
Malaria endemic areas	32 (100.0)	32 (100.0)	
incubation period	1 (3.1)	28 (87.5)	0.875
Recrudescence in *P. falciparum*	1 (3.1)	25 (78.1)	0.781
Relapse in *P. vivax*	0 (0.0)	25 (78.1)	
Criteria for referral	9 (28.1)	10 (31.3)	0.001
Cerebral malaria	23 (71.9)	32 (100.0)	
Effect of incomplete treatment	16 (50.0)	27 (84.4)	0.022
Getting final diagnosis	21 (65.6)	27 (84.4)	0.572
Recommended treatment for *P. falciparum*	5 (15.6)	23 (71.9)	0.563
Recommended treatment for *P. vivax*	13 (40.6)	23 (71.9)	0.004

Participation of GPs throughout the study period

Fourteen doctors out of 32 (44 %) did not keep treatment registers. The mean age (38 years) of the GPs who did not keep registers was significantly younger than the others (45 years) (*t*-test, $P = 0.029$). Female and part-time GPs were less likely to keep registers (Fisher's Exact, $P = 0.021$ and $P = 0.008$ respectively).

Practice on diagnosis during the study period

Out of 4 276 patients in the registers, males accounted for 66.0 %. The mean age of the patients was 26 years (Range 1-66 years). Ninety two percent (3 940/4 276) of the malaria patients were diagnosed by RDT and 3.2 % (135/4 276) by microscopy while 4.7 % (201/4 276) of the patients were diagnosed clinically only. Some doctors did not use RDT or microscopy on a few patients to confirm malaria. About ninety five percent (1 960/2 074) of the confirmed falciparum malaria cases were treated with ACTs. However 38.8 % (78/201) of the clinical malaria cases and 2.3 % of the falciparum negative cases were still treated with ACTs. About 82% (1 649/2 001) of the falciparum negative cases, 37.3 % (75/201) of the clinical malaria cases and 0.8 % of the confirmed falciparum malaria cases were treated with chloroquine and primaquine. Non-malaria drugs were also administered along with the recommended treatment (Table 2). Some doctors used antibiotics to supplement the action of antimalarials.

Table 2 Diagnosis versus malaria treatment by GPs during the study period.

Treatment	Diagnosis		
	Confirmed negative * Frequency (%)	Confirmed positive * Frequency (%)	Clinical diagnosis Frequency (%)
ACTs	46 (2.3)	1960 (94.5)	78 (38.8)
ACTs and other non-malaria drugs	4 (0.2)	8 (0.4)	7 (3.5)
Chloroquine and primaquine	1249 (62.4)	15 (0.7)	67 (33.3)
Chloroquine, primaquine and other non-malaria drugs	400 (20.0)	3 (0.1)	8 (4.0)
Artemisinin and doxycycline	9 (0.4)	46 (2.2)	25 (12.4)
Artemisinin and clindamycin	20 (1.0)	9 (0.4)	7 (3.5)
Injection Artemether	63 (3.1)	4 (0.2)	0 (0.0)
Other combinations (with ciprofloxacin ampicillin, gentamycin etc.)	210 (10.5)	29 (1.4)	9 (4.5)
Total	2001 (100.0)	2074 (100.0)	201 (100.0)

* confirmed for *P. falciparum* by mostly RDT and very few with microscopy

Reliability of information on diagnosis and treatment

Information on diagnosis and treatment from the doctors' register was cross-checked with the patient's response in follow ups. About 79 % (226/287) of the patients said they were diagnosed as malaria by RDT. While 3.8 % (11/287) and 17.4 % (50/287), respectively by microscopy and clinically only. More than seventy percent of the patients (210/287) gave evidence that they were treated with ACTs. 14.3 % of the patients (41/287) took chloroquine and primaquine and 12.5 % (36/287) received other combinations. A highly significant interrater reliability was found on both diagnosis (kappa value = 0.745, $P < 0.001$) and treatment (kappa value = 0.951, $P < 0.001$).

Utilization of private health care

According to the Vector-borne Diseases Control Unit in Mandalay Division, 2 032 malaria patients received care from the public health services during the study period from July 2006 to March 2007 in the study townships. It was about half the numbers of patients who sought care from (participated) private

clinics, during the same period, in the same areas.

DISCUSSION

Proportion of GPs in health care

Private physicians have certain roles in health care, in developing countries. Sixty percent of all physicians in Asia are private doctors, 46 % in Latin America including Caribbean, 46 % in Africa and 35 % in Middle East Crescent. The average is 55 % in developing countries[6]. In Myanmar, 63 % of the doctors involved in health care are private doctors[2].

Seeking care from GPs

A study in Vietnam shows that 60 % of the total number of out-patient contacts, (not including those at pharmacies and drug vendors) choose private sectors[7]. Socioeconomic status is not a determining factor in the utilization of care from private sectors although there is a high proportion of the poor not receiving any medical services[8]. In our study there was twice the number of malaria patients who sought treatment from GPs compare to those who sought care from public health centers.

Quality of GPs' participation in formal health care

Studies have been conducted to assess whether involvement of private sector in formal health care can improve management of some diseases. A study in Uganda suggests that private sector practitioners can help improve the management of sexually transmitted diseases[9]. There have been two success stories in participation of GPs concerning the control of tuberculosis (TB) in Myanmar. Social franchising of TB care through GPs helps reach the target population (i. e. the poor) with quality services and low cost[10]. Involvement of GPs shows increased case notification and high treatment success rate in TB control[11].

Knowledge improvement after training

A certain extent of knowledge improvement of GPs was observed in our study. Knowledge gain was usually achieved after education intervention program. But achieving long term retention of knowledge is rather difficult[12].

Improvement in diagnosis and quality of treatment

The RDTs were available at local drug shops in the study area. The artemisinin derivatives such as artesunate and artemether and their partner drug, mefloquine could be bought as a single drug at a relatively high price and used singly or as a combination therapy. As for the ACTs, artesunate-amodiaquine combination was available in the market. Some antimalarials available in local drug shops might be substandard drugs. In Myanmar, the prevalence of fake antimalarials was 21 % for artesunate and 10 % for mefloquine[13]. Simultaneously with our study, an international NGO, Population Service International (PSI) introduced a social franchise scheme in the private sector on management of malaria. PSI supplied Artequin (Mepha Ltd., Switzerland) containing artesunate and mefloquine (artesunate 600 mg and mefloquine 1 250 mg in total adult doses for 3 days) in blister packs and RDTs (Paracheck, Rapid test device for *P. falciparum* malaria, Orchid Biomedical Systems). A PSI travelling officer visited the GPs once a month and checked stock-balance and monthly client records. The activities of the PSI may influence the improvement in diagnosis and quality of treatment seen in our study.

Although the research team made the microscopic diagnostic facilities available, only 4.7% (201/4 276) of the patients were diagnosed by microscopy in our study. Provision of microscopic diagnostic facilities may not always improve the quality of malaria management. Studies in Zambia and Kenya show that clinics or health care providers prescribe antimalarials not only to microscopy positive malaria cases but also to a large proportion of slide negative patients[14,15]. It seems that health care providers do not trust the results of microscopy. During the study period, RDTs were used to diagnose in 92 % of patients as they were available at subsidized price from PSI and gave immediate results. The fact that only a small proportion of patients (4.7 %) were clinically diagnosed by GPs was a good indicator for better performance in diagnosis of malaria.

Percentage of GPs who knew the recommended treatment for uncomplicated falciparum malaria

(i.e. ACTs) increased from 15.6 % before intervention to 71.9 % at the end of the study. They prescribed ACTs on 95 % of confirmed *P. falciparum* malaria cases during the study period. A significant knowledge improvement was observed among the GPs, regarding recommended treatment of vivax malaria. The RDTs used in the study area could detect only falciparum parasite. Therefore, GPs treated 82.4 % of RDT confirmed *P. falciparum* negative cases with chloroquine and primaquine probably assuming vivax malaria. Information on diagnosis and treatment in GPs' registers was highly reliable as shown by the interrater reliability analysis.

Training alone, without proper diagnosis and treatment facilities, may not improve the practice of GPs in disease management of malaria. This study gave the evidence that with proper training and availability of supplies required for malaria diagnosis and treatment, participation of private general practitioners could support effective malaria control in disease management.

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